US010528611B2

(12) **United States Patent**
Sutton et al.

(10) **Patent No.: US 10,528,611 B2**
(45) **Date of Patent: Jan. 7, 2020**

(54) **DETECTING, CLASSIFYING, AND ENFORCING POLICIES ON SOCIAL NETWORKING ACTIVITY**

(71) Applicant: **Proofpoint, Inc.**, Sunnyvale, CA (US)

(72) Inventors: **Richard Banks Sutton**, San Mateo, CA (US); **Anthony Lawrence Dorie**, San Francisco, CA (US); **Wenchang Yan**, Burlingame, CA (US); **Devin Hugh Redmond**, Encinitas, CA (US); **Raymond Kruck**, Burlingame, CA (US); **Daniel Oshiro Nadir**, Carlsbad, CA (US)

(73) Assignee: **PROOFPOINT, INC.**, Sunnyvale, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 696 days.

(21) Appl. No.: **15/218,817**

(22) Filed: **Jul. 25, 2016**

(65) **Prior Publication Data**

US 2016/0335344 A1 Nov. 17, 2016

Related U.S. Application Data

(63) Continuation of application No. 13/844,178, filed on Mar. 15, 2013, now Pat. No. 9,400,999.

(51) **Int. Cl.**

H04L 25/08	(2006.01)
H04L 29/06	(2006.01)
G06F 16/35	(2019.01)
G06F 16/00	(2019.01)
G06F 16/958	(2019.01)
G06F 16/9535	(2019.01)
G06Q 50/00	(2012.01)
G06F 15/16	(2006.01)
G06F 17/30	(2006.01)

(52) **U.S. Cl.**

CPC ***G06F 16/353*** (2019.01); ***G06F 16/00*** (2019.01); ***G06F 16/958*** (2019.01); ***G06F 16/9535*** (2019.01); ***G06Q 50/01*** (2013.01); ***H04L 63/20*** (2013.01)

(58) **Field of Classification Search**

USPC 709/224

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,412,770	B2	4/2013	Marcucci	
8,621,215	B1	12/2013	Iyer	
8,668,590	B2	3/2014	Barclay	
8,788,442	B1 *	7/2014	Sculley, II	G06N 20/00 706/20
9,037,653	B2	5/2015	Wiseman	

(Continued)

OTHER PUBLICATIONS

Final Office Action for U.S. Appl. No. 13/844,178 dated Sep. 25, 2015, 10 pages.

(Continued)

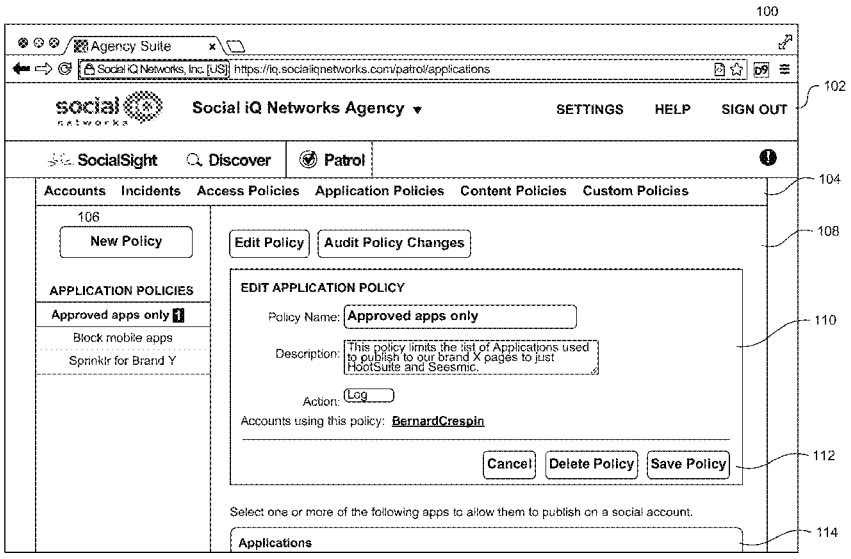
Primary Examiner — Jude Jean Gilles

(74) *Attorney, Agent, or Firm* — Sprinkle IP Law Group

(57) **ABSTRACT**

Technology is disclosed for detecting, classifying, and/or enforcing policies on social networking activity. The technology can store a content policy, classify content posted to a social network, determine that the classification corresponds to the content policy, and apply an action specified by the content policy to the posted content.

20 Claims, 5 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

9,043,417	B1	5/2015	Jones et al.	
9,105,039	B2	8/2015	Kramer	
9,118,689	B1	8/2015	Apte	
9,262,610	B2	2/2016	Lessin et al.	
9,286,378	B1	3/2016	Zarakhovsky	
9,369,433	B1	6/2016	Paul et al.	
9,400,999	B2 *	7/2016	Sutton	G06Q 50/01
10,033,684	B2	7/2018	Sutton	
2010/0153175	A1	6/2010	Pearson et al.	
2011/0113096	A1	5/2011	Long et al.	
2011/0213646	A1	9/2011	Ali	
2011/0276513	A1	11/2011	Erhart et al.	
2011/0321132	A1	12/2011	Slingerland	
2012/0089451	A1 *	4/2012	Agramonte	G06Q 10/10 705/14.23
2012/0124202	A1	5/2012	Cooper	
2012/0150772	A1	6/2012	Paek	
2012/0233265	A1 *	9/2012	Joy	G06Q 50/01 709/206
2013/0046826	A1 *	2/2013	Stanton	G06Q 10/10 709/204
2013/0139224	A1	5/2013	Wehmeier et al.	
2013/0198275	A1	8/2013	Forsblom	
2013/0263206	A1	10/2013	Nefedov	
2014/0012738	A1	1/2014	Woo	
2014/0040170	A1	2/2014	Zheng et al.	
2014/0108946	A1 *	4/2014	Olofsson	G06Q 50/01 715/739
2014/0115181	A1 *	4/2014	Wu	H04L 67/22 709/231
2014/0136492	A1	5/2014	Lerios	
2018/0309710	A1	10/2018	Sutton et al.	
2019/0124109	A1 *	4/2019	Foster	H04L 63/1433

OTHER PUBLICATIONS

Non-Final Office Action for U.S. Appl. No. 13/844,178 dated Jan. 14, 2015, 8 pages.
Notice of Allowance for U.S. Appl. No. 13/844,178 dated Mar. 28, 2016, 9 pages.
Non-Final Office Action for U.S. Appl. No. 14/306,098 dated Aug. 9, 2016, 16 pages.
International Search Report and Written Opinion dated Sep. 1, 2017 in International Application No. PCT/US2017/036594, 8 pages.
Non-Final Office Action for U.S. Appl. No. 14/306,098 dated Sep. 27, 2017, 20 pages.
Office Action for U.S. Appl. No. 14/306,098, dated Apr. 28, 2017, 16 pgs.
Office Action for U.S. Appl. No. 16/019,428, dated Oct. 18, 2018, 6 pgs.
Notice of Allowance for U.S. Appl. No. 16/019,428, dated May 2, 2019, 4 pgs.
Notice of Allowance for U.S. Appl. No. 16/019,428, dated Aug. 5, 2019, 4 pgs.

* cited by examiner

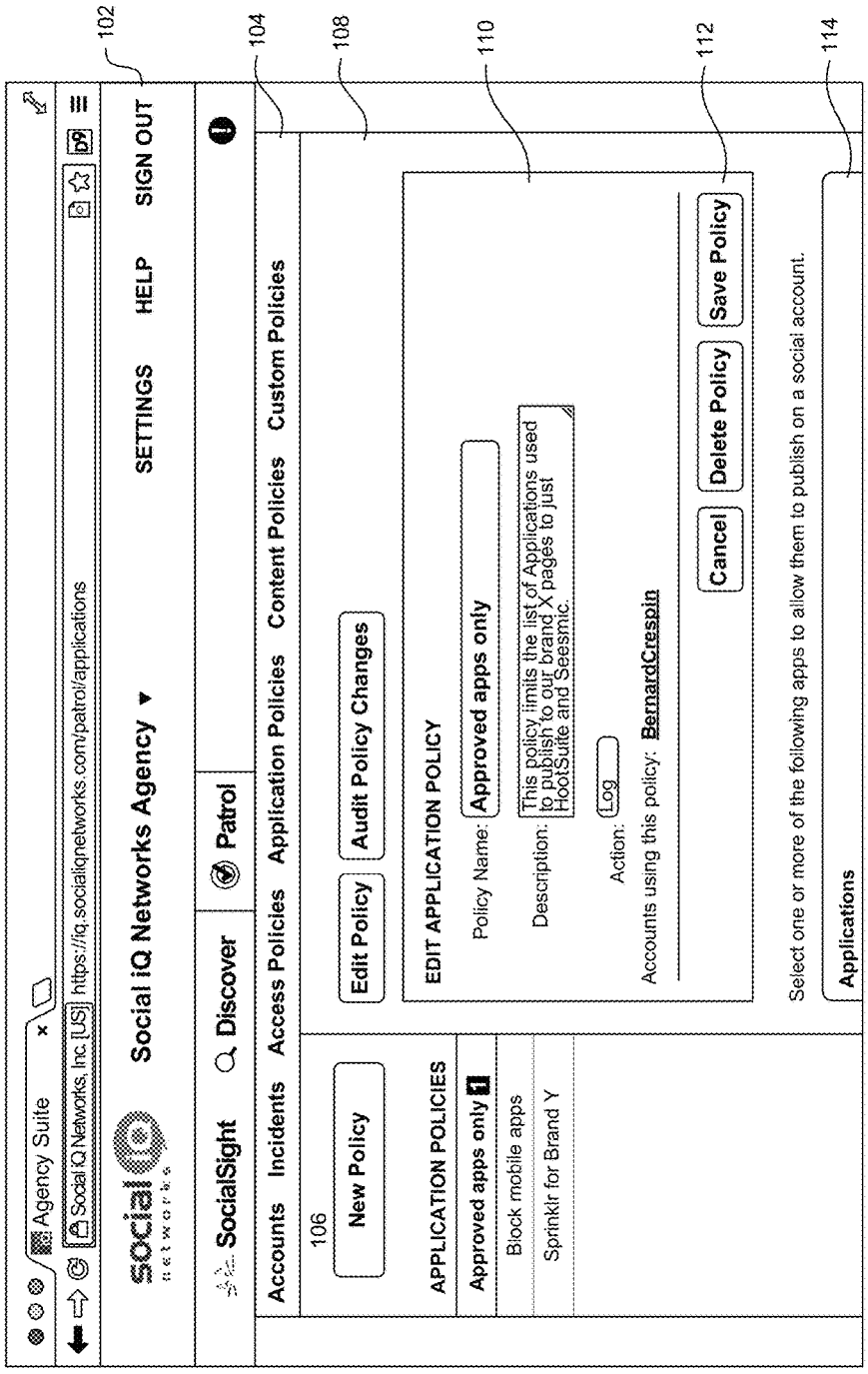

100
Agency Suite
Social IQ Networks, Inc. [US]
https://iq.socialiqnetworks.com/patrol/applications
102
Social iQ Networks Agency
SETTINGS
HELP
SIGN OUT
SocialSight
Discover
Patrol
104
Accounts
Incidents
Access Policies
Application Policies
Content Policies
Custom Policies
108
106
New Policy
Edit Policy
Audit Policy Changes
APPLICATION POLICIES
Approved apps only
Block mobile apps
Sprinklr for Brand Y
110
EDIT APPLICATION POLICY
Policy Name:
Approved apps only
Description:
This policy limits the list of Applications used to publish to our brand X pages to just HootSuite and Seesmic.
Action:
Log
Accounts using this policy:
BernardCrespin
112
Cancel
Delete Policy
Save Policy
Select one or more of the following apps to allow them to publish on a social account.
114
Applications

FIG. 1

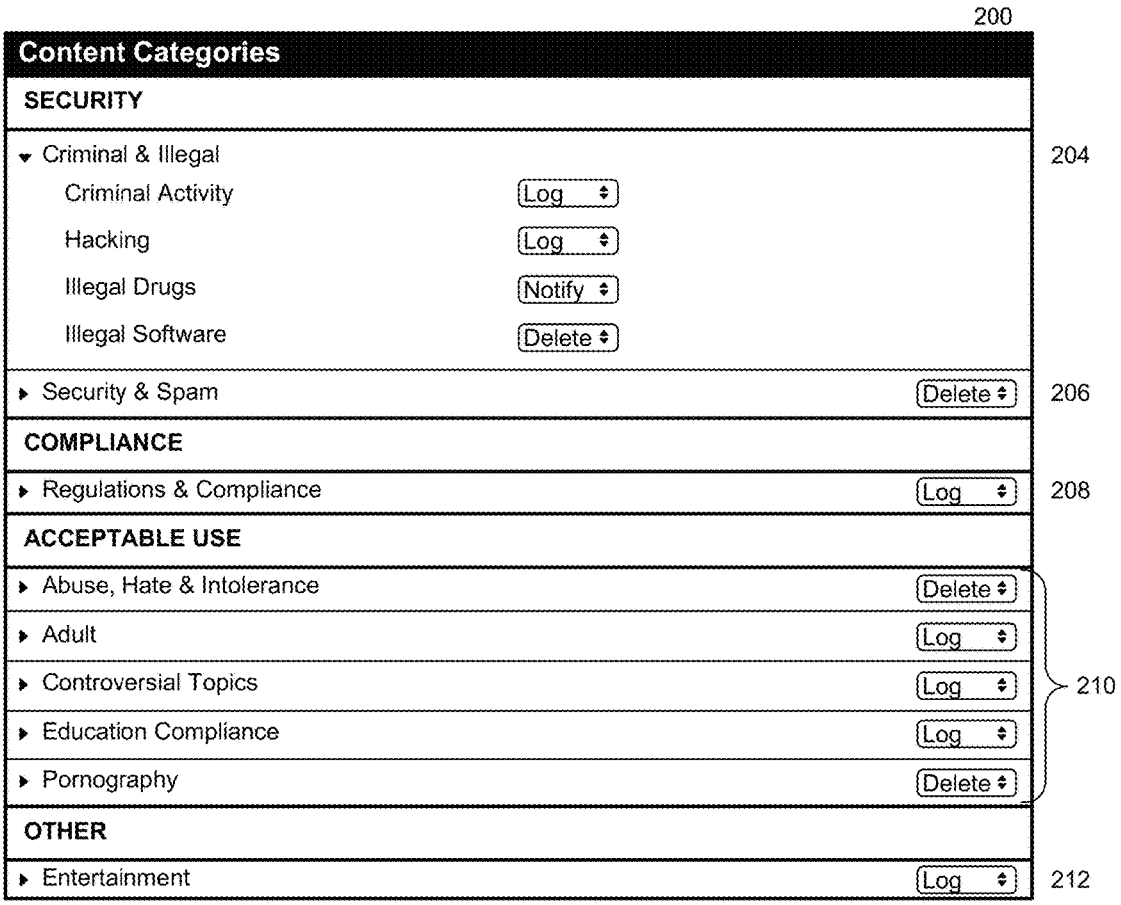

200
Content Categories
SECURITY
Criminal & Illegal
Criminal Activity
Log
Hacking
Log
Illegal Drugs
Notify
Illegal Software
Delete
204
Security & Spam
Delete
206
COMPLIANCE
Regulations & Compliance
Log
208
ACCEPTABLE USE
Abuse, Hate & Intolerance
Delete
Adult
Log
Controversial Topics
Log
Education Compliance
Log
Pornography
Delete
210
OTHER
Entertainment
Log
212

FIG. 2

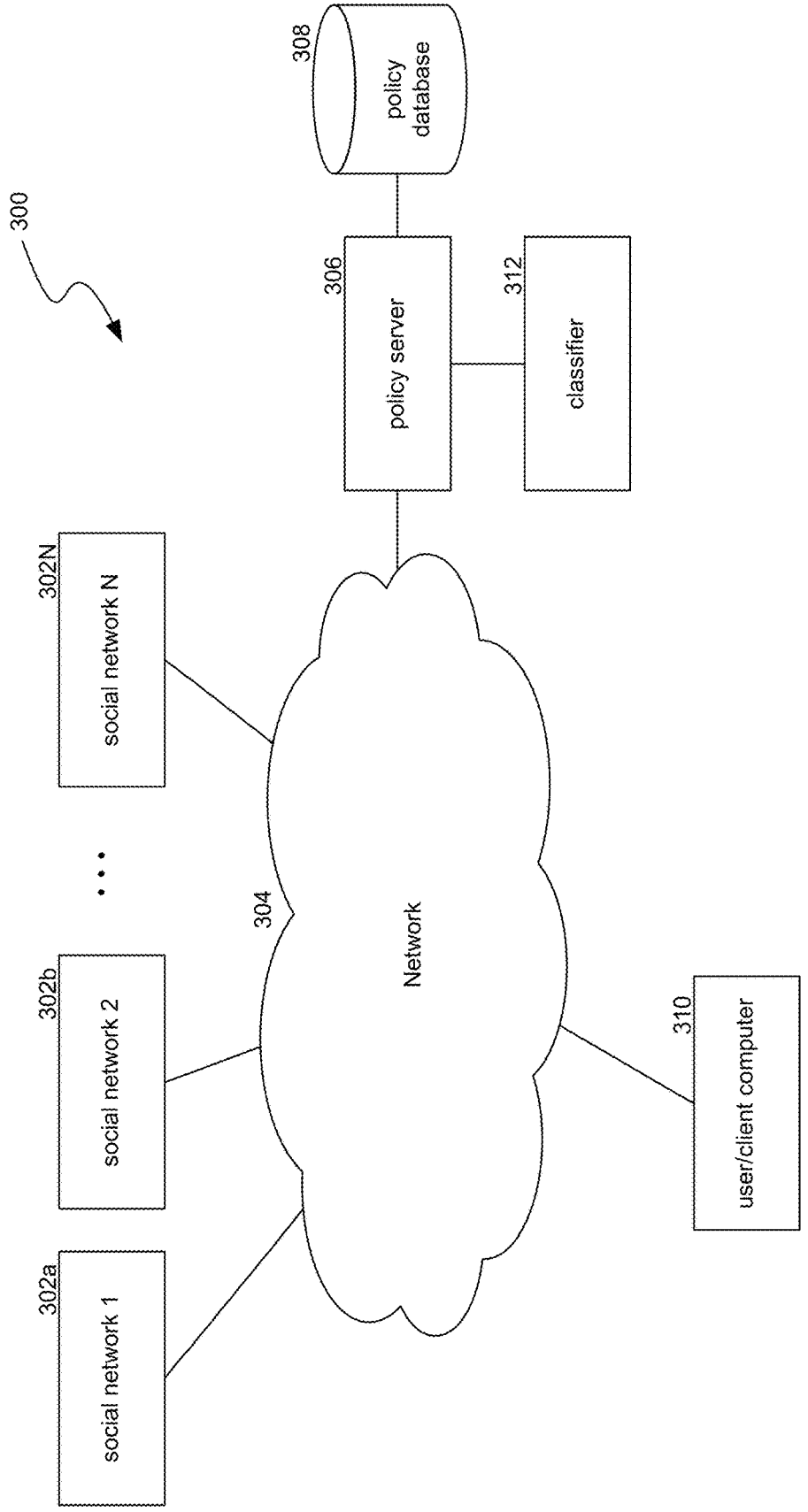

300
308
policy database
306
policy server
312
classifier
302N
social network N
304
Network
302b
social network 2
310
user/client computer
302a
social network 1

FIG. 3

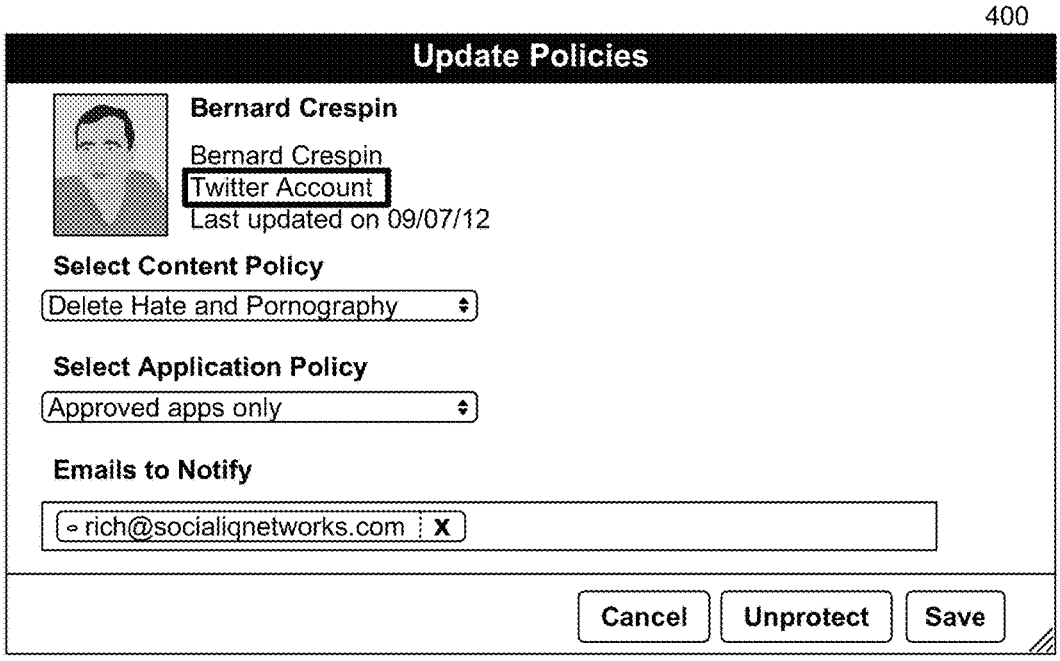

400
Update Policies
Bernard Crespin
Bernard Crespin
Twitter Account
Last updated on 09/07/12
Select Content Policy
Delete Hate and Pornography
Select Application Policy
Approved apps only
Emails to Notify
rich@socialiqnetworks.com
Cancel
Unprotect
Save

FIG. 4A

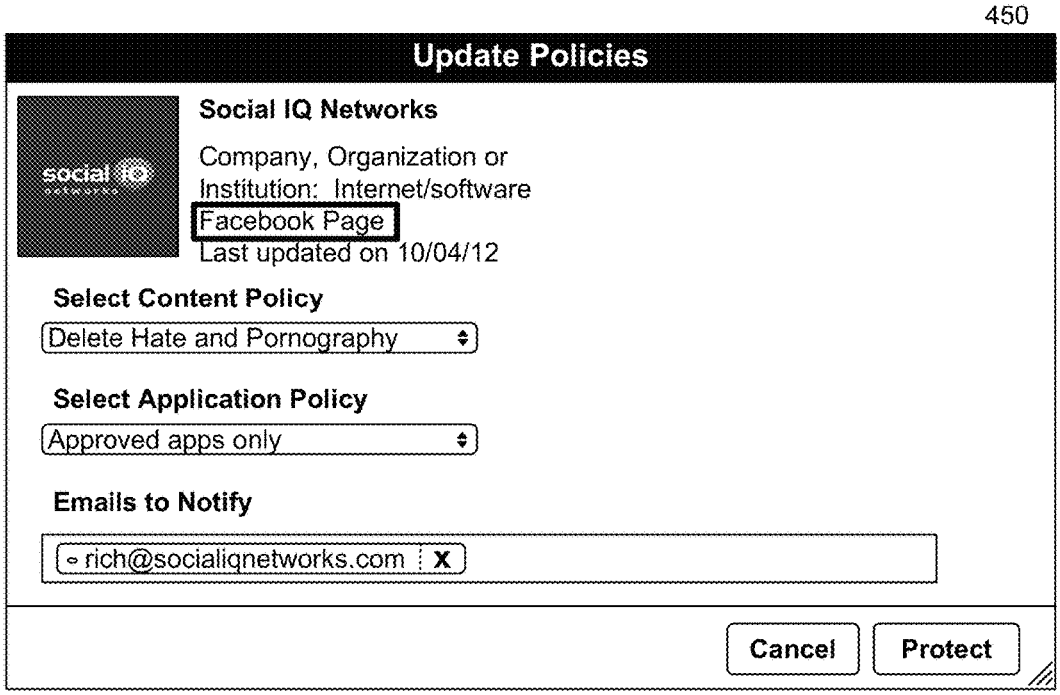

450
Update Policies
Social IQ Networks
Company, Organization or
Institution: Internet/software
Facebook Page
Last updated on 10/04/12
Select Content Policy
Delete Hate and Pornography
Select Application Policy
Approved apps only
Emails to Notify
rich@socialiqnetworks.com
Cancel
Protect

FIG. 4B

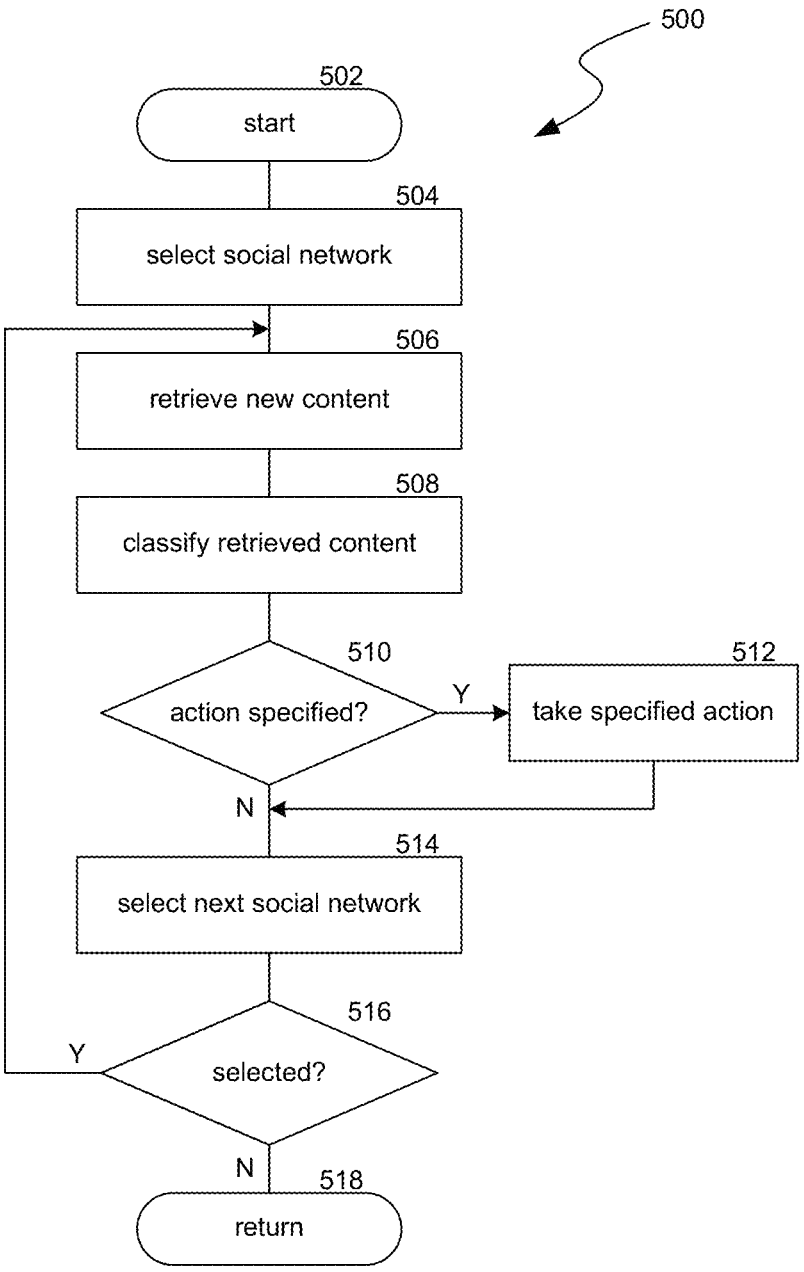

500
502
start
504
select social network
506
retrieve new content
508
classify retrieved content
510
action specified?
Y
512
take specified action
N
514
select next social network
516
selected?
Y
N
518
return

FIG. 5

DETECTING, CLASSIFYING, AND ENFORCING POLICIES ON SOCIAL NETWORKING ACTIVITY

RELATED APPLICATIONS

This application is a continuation of and claims priority under 35 U.S.C. § 120 to U.S. patent application Ser. No. 13/844,178, filed Mar. 15, 2013, entitled "Detecting, Classifying, and Enforcing Policies on Social Networking Activity," the disclosure of which is incorporated by reference herein in its entirety.

BACKGROUND

Social networking platforms and networks, including, e.g., FACEBOOK, GOOGLE+, LINKEDIN, TWITTER, YOUTUBE, XING, and many others, are commonly employed by millions of users. They have become so pervasive that they are now commonly used even by organizations and other commercial enterprises to advertise as well as communicate with their target audiences on behalf of the organizations. (The social networking platforms named in this application may be registered or common law trademarks of entities unrelated to the applicant. Applicant makes no claim of ownership over any such trademarks.)

A social account (or simply "account") is an account on one or more social networking platform ("social network"). An account can be associated with an individual (e.g., a natural person) or it can be associated with an organization (e.g., created by an employee of the organization) for broadcasting information about the organization or its products or services. Creating accounts on these social networks is relatively simple and users can create a "presence" on the social networks for themselves, their products, their brands and/or their initiatives. Organizations can grant to people and applications administrative access to one or more of their social accounts. These social accounts and the activity on them become very valuable forums for communicating with audiences of the organization including, e.g., employees, potential employees, influencers, prospective customers, and customers. Organizations have learned that ensuring the integrity of the content of these accounts is as important as protecting the integrity of the content published on their website.

Social networks generally have application programmatic interfaces ("APIs") that enable third party applications ("social applications" or simply "applications") to integrate with the social networks and provide additional services for the social networks' users. Many social applications provide publishing services that enable users to concurrently publish content across multiple social networks. Many of these social applications for publishing also have APIs that enable third party integration.

Many organizations attempt to enforce written Acceptable Use Policies (AUPs) that define what, how, and where employees may communicate with the company's customers in their roles as representatives of the company and its brands. Companies attempt to enforce their AUPs across all communication channels. However, enforcement can often be difficult.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a user interface diagram illustrating a user interface employed by the technology in various embodiments.

FIG. **2** is a user interface diagram illustrating a user interface employed by the technology in various embodiments.

FIG. **3** is a block diagram illustrating an environment in which the technology may operate in various embodiments.

FIGS. **4**A and **4**B are user interface diagrams illustrating user interfaces for enabling users to specify a set of social accounts onto which content rules will be applied in various embodiments.

FIG. **5** is a flow diagram illustrating a routine invoked by the technology in various embodiments to classify postings made to a social network and take actions on the postings consistent with a specified policy.

DETAILED DESCRIPTION

The disclosed technology detects, classifies, and enforces policies on application and content activity on social networking accounts, e.g., accounts managed by a brand or organization ("managed social accounts") across disparate social application platforms and social networks ("the technology"). In various embodiments, the technology can provide pre-defined and custom detection and policy categories ("categories") for application types, lexical data types, full uniform resource locators ("URLs"), shortened URLs, source types, user types, and digital image types, along with policy action rules ("action rules") including, e.g., ignore, log, archive, notify, quarantine, remediate, delete, and block. The technology is capable of taking these actions without any further input from a user. The technology enables organizations that have multiple social accounts across many social networking platforms to define parameters for what constitutes "appropriate content" (e.g., as outlined in their AUPs) and enforce that set of rules consistently across all social networking platforms on which the organization participates, without having to create a set of rules for each social networking platform on which they have a social account.

In various embodiments, the technology provides a user interface that enables a user to specify a set of rules that govern types of content that can be published (or "posted"). Published content can include content of any type, e.g., originally posted content, responses or comments from other users, uploaded images or multimedia content, etc. The rules together form a "policy." The policy governs metadata of the content or aspects of the content itself, including, e.g.: (a) the social applications that can be used to publish the content; (b) lexical categorization of words that comprise the content (for example: profanity, hate speech, political speech, unprofessional speech, etc); (c) categorization of URLs embedded in the content (for example: links that lead to malicious, spam or pornographic web sites), including URLs shortened by using a URL shortening service; (d) categorization of the image or video types embedded in the content; (e) natural language classification of the words that comprise the content to determine if they represent a breach of the regulatory obligations of the company (FINRA, HIPAA, PII, etc); (f) geolocation of the user who is publishing the content at the time the content is published, or geolocation of a place that the content refers to; (g) specific terms or regular expression patterns specified by the user; and (h) the device used to publish the content (e.g., mobile phones, tablets, laptops, etc).

In various embodiments, the technology may need to collect account authorization information for each social network that is to be managed, e.g., so that the technology

can log in to the social networks, use APIs offered by social networks (or content publishing tools), etc.

In various embodiments, policies can be predefined, e.g., so that a user associated with a particular organization can simply specify the type of organization with which the user is associated. The predefined policies may specify default actions, but the policies may be fine-tuned by the user. As an example, a bank may require different policies than a technology company. The bank may need to comply with regulatory issues but the technology company may just be focused on its brand.

The policies can vary across organizations, users, publishing tools, geographical location, time of day, user device, etc. As an example, a policy may specify that one user is allowed to post some types of content but not other types of content. A policy may specify that a particular publishing tool can be used but not others. A policy can specify that a particular policy is to be applied for users in one geographical region and a different policy for users in a different region. A policy can specify that some types of content can be published using a particular tool during a specified time period. A policy can specify that some types of content cannot be posted using a mobile computing device. The technology is thus able to work with a wide set of types of policies and the circumstances surrounding their application. These can be treated as policy attributes and a policy can comprise multiple policy attributes, thereby forming compound policies. As an example of a compound policy, a user can specify that a post can be published if the user uses an approved publishing tool and the post occurs within the hours of 9:00 am and 5:00 pm on a weekday. The technology can treat compound policies as a single policy.

Several embodiments of the described technology are described in more detail in reference to the Figures. The computing devices on which the described technology may be implemented may include one or more central processing units, memory, input devices (e.g., keyboard and pointing devices), output devices (e.g., display devices), storage devices (e.g., disk drives), and network devices (e.g., network interfaces). The memory and storage devices are computer-readable media that may store instructions that implement at least portions of the described technology. In addition, the data structures and message structures may be stored or transmitted via a data transmission medium, such as a signal on a communications link. Various communications links may be used, such as the Internet, a local area network, a wide area network, or a point-to-point dial-up connection. Thus, computer-readable media can comprise computer-readable storage media (e.g., "non-transitory" media) and computer-readable transmission media.

FIG. **1** is a user interface diagram illustrating a user interface **100** employed by the technology in various embodiments. The user interface **100** can be presented in a Web browser, standalone application, applet, etc. The user interface **100** includes a region **102** that a user can use, e.g., to sign in or sign out of the user interface **100** associated with the technology. After a user has signed in, the technology enables the user to view social accounts the user can manage, view incident reports (e.g., violations of policies), manage access policies, manage social application policies, manage content policies, and manage other policies ("custom policies"), e.g., by selecting links in a links region **104**. The user can create a new policy by selecting a new policy region **106**. The user can enter details about the new policy or manage an existing policy by selecting options in region **108**. The user can provide details about the policy, e.g., the policy name, its description, etc., in region **110**. The user can delete policies, or save the newly created policy or changes to existing policy by selecting options in region **112**. The user can publish to a social network using the accounts associated with the user by selecting options in region **114** (not fully illustrated).

FIG. **2** is a user interface diagram illustrating a user interface **200** employed by the technology in various embodiments. Using the illustrated user-interface **200**, a user can identify actions to be performed when the technology detects a violation of one or more rules associated with a policy. The actions can include, e.g., (a) notifying the user or a set of users via an email, text message or other form of electronic communication; (b) creating a record of the violation in a database for a user to look at later; (c) removing the content from its corresponding social network if it is found after it has been published; and (d) preventing the content from being published to any social networks if the content is found before it is published. The user-interface **200** can include a first security region **204** to identify actions to be performed when the technology detects criminal and/or illegal activity and a second security region **206** to identify actions to be performed when the technology detects "spam" or other specified security activity. In various embodiments, a set of default actions may be associated with, e.g., a type of organization that the user is associated with. The user can then fine-tune the default actions by using the illustrated options. As an example, the user-interface **200** can include a compliance region **208** to enable a user at an organization that has specific regulatory compliance issues to fine tune a default selection. The user-interface **200** also includes an acceptable use region **210** to enable the user to modify selections for content. The user-interface **200** can also include an "other" region **212**, e.g., to control content not associated with the previously identified regions.

In various embodiments, categories of policies can be grouped so that, for example, a single policy action can apply to all members of the group.

After the user has specified (or revised) actions, the technology stores the content rules and associated actions as a "policy" into a policy database. A policy database can be stored in a database management system, file system, or indeed any other type of data storage medium. FIG. **3** is a block diagram illustrating an environment **300** in which the technology may operate in various embodiments. The environment **300** can include one or more social networks, e.g., social network 1 **302**A, social network 2 **302**B, and social network 3 **302**N. The social networks may be communicatively coupled via a network **304** (e.g., an intranet, the Internet, etc.) with a policy server **306** associated with the technology and one or more client computing devices **310**. The policy server **306** may have associated with it a policy database **308**, e.g., to store policies, and a classifier **312** to classify content. The classifier **312** may classify text, images, multimedia, etc. One skilled in the art will recognize that policy database can store information in various data formats.

FIGS. **4**A and **4**B are user interface diagrams illustrating user interfaces **400** and **450**, respectively, for enabling users to specify a set of social accounts onto which content rules will be applied in various embodiments. The social accounts can be from any social networking platform and are defined as a set separately from the rules that combine to form a policy as described above. User interface **400** illustrates that a user can select that hate and pornography content is to be deleted and that only approved applications can be used to post information to a specified TWITTER account. When the policy is violated, an email message will be sent to a

specified email account to notify the user of that email account. Similarly, user interface **450** illustrates a similar policy for a specified FACEBOOK page.

FIG. **5** is a flow diagram illustrating a routine **500** invoked by the technology in various embodiments to classify postings made to a social network and take actions on the postings consistent with a specified policy. The routine begins at block **502**. At block **504**, the routine selects a social network, e.g., from a list of social networks associated with an account or user that is presently employing on whose behalf the technology is presently operating. At block **506**, the routine retrieves new content from the selected social network, e.g., content that may have been added since the last time the technology checked the selected social network. At block **508**, the routine classifies the retrieved content. As an example, the routine may classify the retrieved content as pornographic, violating a particular regulation, etc. Various technologies can be employed for classifying content, e.g., text analysis, image analysis, etc. At decision block **510**, the routine determines whether an action is specified for the classification. As an example, if a policy is associated with the classification, the policy may indicate an action. If an action is specified, the routine continues at block **512**. Otherwise, the routine continues at block **514**. At block **512**, the technology takes the specified action. As an example, the specified action may be to alert a user or delete the content. After taking the action, the routine continues at block **514**. At block **514**, the routine selects another social network. At decision block **516**, the routine determines whether another social network was selected. If another social network was selected, the routine returns to block **506**. Otherwise, if all social networks have been processed, the routine returns at block **518**. The routine may be invoked at regular time intervals, random time intervals, upon detection that content has been uploaded to a social network or is about to be uploaded to a social network, etc. In various embodiments, the routine invokes APIs relating to the social networks or APIs relating to content publication tools. In various embodiments, the technology and the routine may be invoked by social networks or content publication tools, e.g., as part of an extension provided by the social networks or publication tools.

Those skilled in the art will appreciate that the logic illustrated in FIG. **5** and described above may be altered in a variety of ways. For example, the order of the logic may be rearranged, substeps may be performed in parallel, illustrated logic may be omitted, other logic may be included, etc.

In various embodiments, the technology detects, classifies, and/or enforces policies on social networking activity by storing a content policy; classifying content posted to a first social network; determining that the classification corresponds to the content policy; and applying an action specified by the content policy to the posted content. The action can be to delete the content without user input. The classifying, determining, and applying can be done on content posted to a second social network. The policy can be stored only once for both the first and the second social networks. The classifying can occur before the content is posted to the first social network and/or after the content is posted to the second social network.

In various embodiments, the technology can provide various reports or "views" of policy actions taken. As examples, the technology can produce reports showing incidences of the technology ignoring, logging, archiving, notifying, quarantining, causing to remediate, deleting, or blocking content. The reports can be selectively generated, e.g., for specific users, accounts, actions, etc.

Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the claims. Accordingly, the invention is not limited except as by the appended claims.

We claim:

1. A method performed by a computing device to detect, classify, or enforce policies on social networking activity, the method comprising:

associating a managed social account with a plurality of accounts across disparate social networking platforms;

storing a content policy corresponding to the managed social account;

objectively classifying content posted from the managed social account to the plurality of accounts across the disparate social networking platforms;

determining whether a classification from the objectively classifying violates the content policy corresponding to the managed social account; and

applying at least one action specified by the content policy to the content without user input.

2. The method of claim **1** wherein the applying the at least one action includes identifying content that is to be deleted from the managed social account.

3. The method of claim **1** wherein the objectively classifying includes classifying the content based on at least one of an image or video embedded in the content.

4. The method of claim **3** wherein the objectively classifying further includes classifying the content based on metadata associated with at least one of the image or video.

5. The method of claim **1** wherein the content policy specifies one or more users, and wherein the determining includes determining whether the content was posted by at least one of the one or more users.

6. The method of claim **1** wherein the content policy specifies one or more applications, and wherein the determining includes determining whether the content was posted by an application other than the one or more specified applications.

7. The method of claim **1** wherein the content policy specifies one or more devices, and wherein the determining includes determining whether the content was posted by a device other than the one or more specified devices.

8. The method of claim **1** wherein the content policy specifies one or more geographic locations, and wherein the determining includes determining whether the content was posted from a geographic location other than the one or more geographic locations.

9. The method of claim **1** wherein the content policy specifies a time of day, and wherein the determining includes determining whether the content was posted at a time of day other than the specified time of day.

10. The method of claim **1** wherein the content policy specifies a social networking platform and a content type associated with the networking platform, and wherein the determining includes determining whether the content is a content type other than the specified content type.

11. The method of claim **1** wherein the content policy is a compound policy that includes a first policy attribute and a second policy attribute, and wherein the determining includes determining whether the classification violates both of the first policy attribute and the second policy attribute.

12. The method of claim 1 wherein the content policy specifies a social networking platform and a content type associated with the social networking platform, and wherein the determining includes determining whether the content is a content type other than the specified content type.

13. The method of claim 1 wherein the determining includes determining a relative amount of time between when the content was posted and when other content was posted.

14. The method of claim 1 wherein the content policy specifies specific terms or expression patterns found across the disparate social networking platforms.

15. A computer system, comprising;

at least one central processing unit; and

at least one non-transitory computer readable medium storing instructions translatable by the at least one central processing unit for:

associating a managed social account with a plurality of accounts across disparate social networking platforms;

storing a content policy corresponding to the managed social account;

objectively classifying content posted from the managed social account to the plurality of accounts across the disparate social networking platforms;

determining whether a classification from the objectively classifying violates the content policy corresponding to the managed social account; and

applying at least one action specified by the content policy to the content without user input.

16. The system of claim 15 wherein the applying the at least one action includes identifying content that is to be deleted from the managed social account.

17. The system of claim 15 wherein the objectively classifying includes classifying the content based on at least one of an image or video embedded in the content.

18. The system of claim 15 wherein the content policy specifies one or more users, and wherein the determining includes determining whether the content was posted by at least one of the one or more users.

19. The system of claim 15 wherein the content policy specifies one or more applications, and wherein the determining includes determining whether the content was posted by an application other than the one or more specified applications.

20. The system of claim 15 wherein the content policy specifies one or more devices, and wherein the determining includes determining whether the content was posted by a device other than the one or more specified devices.

* * * * *